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THE PREVENTION AND TREATMENT
OF CRURAL ADDUCTION.

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THE PREVENTION AND TREATMENT OF CRURAL ADDUCTION.¹

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MOST of the moderately advanced cases of hip disease that I have examined have presented an adducted thigh; and this is equally true of those who have first applied after the cure of their disease. Drs. Shaffer and Lovett in their admirable investigation of the "Ultimate Results of the Mechanical Treatment of Hip-joint Disease"² found 10° to 30° adduction in nearly one-half (11 out of 24) of the cured cases examined to determine this point; the report included only those cases treated at the New York Orthopædic Dispensary and Hospital who had been discharged cured not less than four years previously. There is no doubt that the proportion of adducted thighs in old cases cured by less thorough methods is considerably greater. Typically deformed old hip cases form one of the commonest and worst classes of the permanently crippled, and as seen on our streets, more than three-quarters show an adduc-

¹ Read before the New York Academy of Medicine, Orthopædic Section, Feb. 15, 1889.

² New York Medical Journal, May 21, 1887.



tion easily observable in the carriage of the body ; in addition the thigh is usually flexed and inverted, and the deformity and disability are sometimes so great as to doom the sufferer to crutches for life. Take a few examples of the condition of the hip-joint in cured cases that had been treated by methods other than properly applied traction.

CASE I.—Girl, twelve years old, first seen in 1880, having been free from symptoms of disease for five years. She had had right hip disease at five, lasting a year and a half. An abscess appeared in 1874, which discharged four months. Plaster bandage, short splint, and weight and pulley had been used, followed by crutches for two years ; since then the patient had used one crutch. Examination showed a stiff hip, adducted about thirty degrees and considerably flexed and inverted. She wore a steel patten three inches high. This girl died of phthisis five years later.

CASE II.—Girl, eighteen, seen in 1880. She had had double hip disease in childhood. There were eight large cicatrices about the hip ; none had discharged for two years. Both thighs were ankylosed and adducted. The right was drawn in the most, and it was also flexed, so that the popliteal space of the right limb came directly over the inner condyle of the left femur ; the legs were crossed bringing the inner borders of the feet to the outside. The inner (small toe) edges were six inches apart. The patient walked from the knees, which were loose.

CASE III.—Male, eighteen, seen in 1883. Left hip disease in 1880. Leg and pelvis incased in plaster sixty weeks. Had been walking about and considered his hip well. There was but a trace of motion and the thigh was flexed and strongly

adducted. When seen he was laid up with an acute abscess, probably extra-articular.

CASE IV.—Gentleman, fifty years old, seen in 1885. Right hip disease when about four years old, abscesses followed and discharged two or three years. Patient had gone around all his life with leg drawn up and in, until a year before, when, owing to appearance of pain and increase of disability, he took a crutch, which he had used since. Right trochanter was two inches above Nélaton's line. Thigh was flexed and extremely adducted. There was pain in the hip, though he bore no weight on it. He wore about five inches extra sole.

CASE V.—Gentleman, about thirty-two, seen in 1887. Right hip disease at four years, no abscess. Was walking in a year. Ankylosis with considerable flexion and adduction. Walked very fairly.

CASE VI.—A lady, about twenty-seven, seen in 1887. Disease of left hip-joint at three years. Treated by weight and pulley with plasters below the knee. Disease, including a relapse, lasted five or six years, most of which time she was off her feet; the later part of the time she walked on crutches. She had a flail-knee from improper application of the traction. Extensive hip motion, but there was 15° permanent adduction, and two and a half inches shortening. Walked with cane short distances only, and disability was increasing.

This recital might be considerably prolonged, but perhaps enough has been said to give an idea of the condition in which patients are frequently left after the cure of their disease, when imperfect methods have been employed.

When a patient has suffered from hip disease, which was not arrested in the earliest stage, but has

gone on to destroy portions of the joint tissues, it is still possible for him to make a recovery which will be more or less perfect according to the protection afforded by the treatment. The ulcers and erosions in the joint may heal and be repaired by bone and cicatricial tissue, rough places may be somewhat smoothed off, sinuses and abscesses dried up, and the joint left free from disease. Even when this favorable result takes place (and we regularly expect it under the protective plan of treatment) the patient recovers with a more or less useful, but still a functionally imperfect joint presenting one or more of the following conditions:

1. Impairment or loss of hip motion.
2. Joint instability.
3. Shortening and atrophy of the affected limb.
4. Malposition of the thigh, which may be permanently adducted, or rarely abducted, with flexion, and often with inversion or eversion.

Of these regular sequelæ of the disease the malpositions are certainly the most serious as regards the comfort of the patient and the usefulness of the limb, and probably the most preventable and curable. I have never seen a case of ankylosis in good position of one hip where the locomotion was not excellent, and I have seen several ankylosed cases where the abnormality of gait was so slight as easily to escape notice, owing to the nearly perfect compensation at the lumbar spine, the knee, and the opposite hip.

Take as illustration CASE VII., a young man of nineteen, whom I examined in 1885. He had had left

hip disease at two years, and had been treated on the protective plan by Dr. C. Fayette Taylor for several years. He had had an abscess which had closed years before. Home coöperation had not been of the best, but he got well with ankylosis in perfect position. In 1885, nine years after leaving off treatment, he was in rugged health and walked freely without support, and with a scarcely perceptible limp. The thigh was ankylosed, moderately flexed, parallel to the median line, and the two legs were equal in length.

Last year I examined a former patient, a lady (CASE VIII.) twenty-eight years old, whose left hip became affected in 1881. She was treated by recumbency with weight and pulley for a year and a half without benefit. At the end of that time she came under my care; the thigh was slightly flexed and considerably adducted and there was deep fluctuation in front of the hip. The adduction and fluctuation disappeared under protective treatment and she recovered with ankylosis in perfect position. At the last examination a year after her discharge, there was very slight flexion of the thigh, which was parallel to the median line. The affected limb measured one-quarter inch longer than its mate, as I convinced myself by repeated trials. Her health was robust, she walked freely without support of any kind and with a hardly perceptible abnormality.

Shortening after hip disease can be compensated, and, unless excessive, does not compromise the usefulness of the limb even when added to ankylosis. When a joint is so much eroded and relaxed as to afford no firm bearing, the limb may be less useful and the gait insecure, but this condition is not very common at the hip, at least in a disabling degree,

except after excision. On the other hand, considerable flexion or abduction, or a moderate amount of adduction with or without actual shortening, seriously interferes with bodily equipose and harmonious muscular action, and tends to render the carriage so awkward and the gait so limping and difficult, that both the endurance and the locomotor capacity of the patient are much curtailed. Some flexion nearly always remains, and a moderate amount is favorable where stiffness exists, since it more readily than any other position permits both standing and sitting. Slight abduction of the thigh is also favorable, as it prevents crowding of the thighs and compensates shortening to a certain extent, but is not usually attained except as the direct result of special management.

Eversion ordinarily goes with abduction and inversion with adduction, but the association may be reversed. They are not usually very disabling in themselves.

Adduction is the worst of the malpositions and is bad in any degree. The pelvis is tilted up on the affected side, increasing practical shortening and bending the lumbar spine laterally in order to bring the limbs vertically parallel, balance is deranged, and spontaneous movements of the body and limbs are adjusted to an awkward position. Every muscle is used at a disadvantage, there is undue strain on the knee and back; the thighs are crowded together, and the patient's general health and vigor frequently suffer from the severe strain of movements performed under unnatural and hampering conditions.

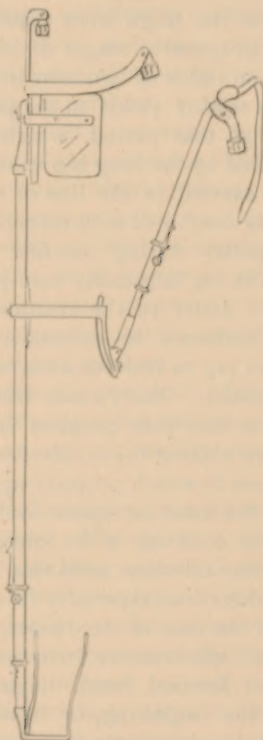
I have seen several cases where no cause other than crural adduction could be discovered for extreme rotary lateral curvature of the spine.

Adduction of the thigh from muscular spasm in the acute or progressive stages of hip disease is in some measure an index of articular irritation and in most instances readily yields to the protective traction required at that period, which can be adequately furnished by the long hip splint. The traction is always exerted in the line of the deformity, and is regularly combined with recumbency and the weight and pulley during the first few weeks of treatment. The leg falls easily into position as the spasm relaxes. Later in the treatment, if signs of irritation or tendency to deformity develop, the patient is again put to bed for a few weeks and the stretching repeated. Many cases treated from the early stages on this plan progress uninterruptedly toward recovery without the occurrence of deformity. In the rare cases in which properly applied traction fails to relieve the muscular spasm owing to products of inflammation confined in the joint, the tendency to adduction may continue until this is relieved.

Persistent adduction, especially in the recovering stages, or after the cure of the disease, whether from the severity of inflammatory irritation, subluxation of the eroded femoral head, neglect of proper treatment in the beginning, or from other causes, often requires special means to overcome it. The long hip-band carrying two perineal straps and the abduction screw were formerly employed for this object. With the idea of securing greater simplicity

and solidity of construction as well as greater precision of action the hip-band and abduction screw

FIG. 1.



Traction splint.

were discarded by Dr. Taylor some twelve years ago, and the traction splint used without a joint, the

single perineal strap being carried on the anterior and posterior ends or horns of a properly curved stiff steel bar riveted to the side plate of the apparatus. This splint (Fig. 1 shows front view with ratchet abduction crutch added) furnishes any desired amount of traction, and limits though it does not abolish motion at the hip-joint; it has given **great satisfaction in practice.**

In the regressive and recovering stage after the subsidence of inflammation, we have found great advantage in the use of the jointed supporting splint (Dows',¹ Fig. 2, front view with toggle abduction crutch added) which enables the patient to use the joint and limb without subjecting it to injurious pressure.

When a direct abducting force is required we add to the traction splint or Dows' an abduction crutch or attachment (shown enlarged at right of Fig. 2). This consists in a double (compound) steel bar acting as a toggle-joint, the lower end of which is pivoted to the knee-plate of the apparatus, and the upper end terminating in a properly curved steel band covered with hard rubber and accurately fitted to the ischial fold opposite the affected hip. The length of the bar can be varied by shifting the pin jointing its two halves. When the toggle-joint acts, a direct abducting force is put upon the affected leg. This apparatus serves for comparatively mild cases or as a retaining apparatus after abduction has been produced.

¹ In use sixteen or seventeen years, shown at the Amer. Orthopædic Association Meeting, Washington, September, 1888. Its use as a supporting apparatus in weak joints after the excision of the hip has been suggested.

FIG. 2.



Traction supporting splint.

For severe and long-standing cases the patient is put to bed with the traction splint applied, and a ratchet crutch (shown in Fig. 1), pivoted to the

inner knee-plate of the apparatus, is applied, by means of which a progressively modified abducting force can be applied to the thigh. Usually a few weeks in bed with the ratchet abduction crutch, the leg being in a sling and extra weight attached to the traction splint, will cause exceedingly obstinate and long-standing cases to yield, as has been practically demonstrated several scores of times. On getting up, if the hip still requires protection, the traction splint or Dows' is used according to the special indications presented, and the toggle-joint abduction crutch is added as a retaining appliance, when necessary, since the ratchet abduction crutch is not conveniently worn except during recumbency.

If no disease is present, the patient on getting up may or may not require retaining apparatus. If one is necessary to hold the thigh properly abducted for a longer or shorter period, the jointed supporting splint with toggle-joint abducting attachment, but without horns or perineal strap, often answers the purpose, but a more efficient apparatus is the median abduction splint (Fig. 3). It consists of an apparatus jointed at the knee and provided with a slip-joint at the ankle, the supporting bars being on the inside of the leg. Since it is not intended for hip protection, but merely as a retentive apparatus, with provision for knee protection, it has no perineal strap. It is secured by plaster to the inside of the thigh, as is the Dows', and has pivoted to the knee-joint the toggle abduction attachment. This leaves nothing to be desired as an abduction re-

FIG. 3.

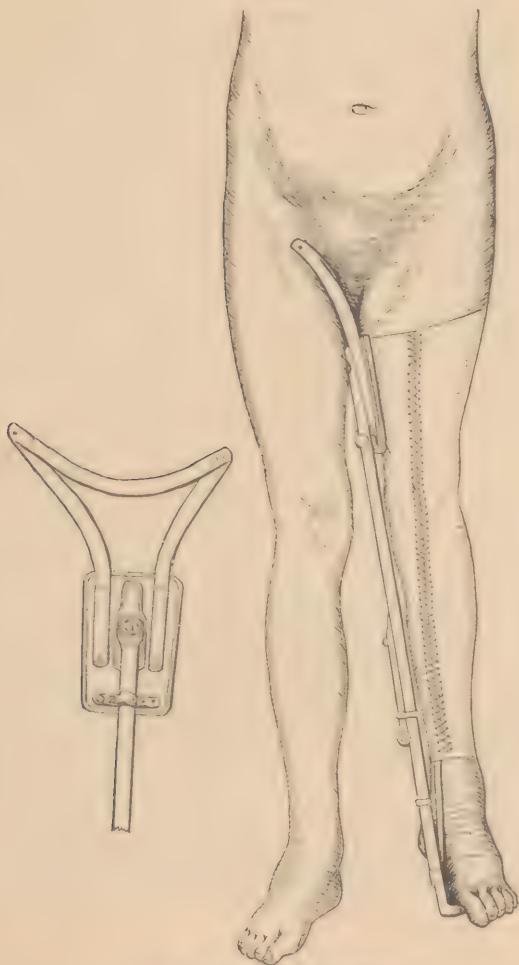


Median abduction splint.

tainer, and as it can be worn indefinitely without discomfort, patient and surgeon are independent of time.

It would seem that the apparatus described, which

FIG 4.



Long median abduction splint.

have been in use more than a dozen years, met every indication in connection with the prevention and cure of the adducted position, but in dealing with a few particularly intractable cases, especially some due to causes other than hip disease, such as fracture of the femoral neck, old dislocations of the hip, etc., still more powerful means have been found desirable, and Dr. Taylor devised the long median abduction apparatus (Fig. 4¹). By means of this apparatus we can apply to the limb a very powerful, direct acting abducting force, capable of exact regulation; and, after four years' experience in its use, I can report that from a few days to a few weeks have been sufficient to abduct the limb in the considerable number of cases in which I have used it. I relate a few cases illustrating the methods described.

CASE IX. — A stout boy of fifteen, recently discharged cured, had right hip disease at five years of age. He has had no disease for some time, but his treatment was prolonged by the strong and persistent adduction, which necessitated a week's stretching, two or three times repeated, with the long median abduction splint and the wearing of the painted median splint as a retaining apparatus. The tendency to adduction was completely overcome, and the leg is now slightly abducted and flexed, with two inches shortening and a few degrees of motion. There never was an abscess; the boy's health is robust. He has left off all support and walks well.

¹ Shown at the meeting of the American Orthopaedic Association, New York, June, 1887, and described in the *New York Medical Journal*, November 19, 1887.

CASE VIII., already related, came with a nearly stiff joint and about ten degrees of persistent adduction, which was observed after her long confinement in bed with the weight and pulley. The adduction was overcome by the use of the long traction splint, with abduction crutch worn in bed. She did well, but a year later the hip was still stiffer, and there was some recurrence of the adduction, which was overcome with the long median splint in about a week. On getting up she wore the Dows' splint with toggle abduction crutch, and was cured with ankylosis and perfect position (the limb slightly abducted).

CASE VI., already mentioned, is now under treatment for the adduction, although it is twenty years since her joint was cured. I applied the long traction splint with ratchet abduction crutch, and have attached adhesive plasters only above the knee, and in such a way that it is completely protected. The leg was quite resisting, but yielded to a few weeks' traction, and was thrown into abduction, so that I was able to remove three-fourths of an inch from the high shoe she was wearing. I am now making a jointed median retaining splint for her.

CASE X.—In a boy of thirteen, whose left hip was dislocated at birth, causing flexion and extreme adduction with great disability, complicated by extreme secondary rotary lateral curvature of the spine, I have been able to overcome the adduction whenever he took a few days in bed with the long median abduction splint. There has been difficulty in holding it owing to the lateral curvature, but the deformity has been greatly reduced.

CASE XI.—A lady of over fifty came recently with a severe senile coxitis with stiffness and over fifteen degrees permanent adduction. The defor-

mity was overcome by a month's application of the long median abduction splint. There is also difficulty in this case, from special complications, in retaining the corrected position, and here, as in the preceding case, I still apply the long median traction splint at night, fastening it to the lower end of the supporting splint, with gratifying results.

CASE XII. — A girl of twenty applied at the N. Y. Orthopaedic Dispensary and Hospital in 1874, walking on crutches, to which she had been confined ever since her trouble began. She had had left hip disease at ten, with very extensive abscesses, which discharged about two years. When seen in 1874 the thigh was extremely flexed, and Dr. Newton M. Shaffer, who remembers the case very well, says there was adduction and not much motion; the record is defective on these points. She was treated with the traction splint and in five weeks was able to walk about without her crutches; the shortening was two and a half inches. In a few months she took off the brace, but in 1877 suppuration recurred at the old site, lasting six months, and a supporting apparatus with abduction crutch was applied in 1878. She has been in the habit of reporting to me once or twice a year since then, and has been reluctant to give up her brace, though she has been well for many years. I took off the abduction piece two and a half years ago, and the entire brace six weeks ago. For over eleven years there has been no suppuration or sign of hip trouble. There is now extensive motion in every direction, no deformity, the thigh being slightly abducted; there is three inches shortening; she is in good health and walks readily without support and but moderate limp. This patient was shown at the meeting of the Section.

CASE XIII. — Girl, ten years old. Left hip disease

at age of three. Came under treatment six months later and was one of those exceptional cases not readily relaxed by traction. Abscesses formed in Nov. 1884, and discharged for a year. Three years ago suppuration ceased and the patient has been free from active disease, in good health and walking nicely, but with rather persistent adduction, which has been treated with the median abduction splint (Fig. 3). This patient was exhibited to the Section to show the apparatus in action.

CASE XIV.¹—A gentleman reported in 1883 with an adduction of the right leg of thirty years' standing, from an injury to the hip. When seen the adduction amounted to about twenty degrees, and could not be diminished by manual force; together with the actual shortening it necessitated an extra sole three inches and three-quarters in thickness. The adduction was completely overcome in less than two weeks, the legs restored to vertical parallelism, and the sole reduced to one inch and three-quarters, which represented the actual shortening. Progression was rendered very much easier, and the patient did not complain of pain or fatigue as he had done. The position was easily maintained by the jointed median splint. The apparatus used in this case to overcome the deformity was the long traction splint with ratchet abduction attachment (Fig. 1).

There is a large field for brilliant results in old cases of joint disease or joint injury which have long since been pronounced cured, but whose limbs have been left in such faulty position that they are deprived in great part of their legitimate use.

¹ Reported in the N. Y. Med. Journ., Nov. 19, 1887.

With the improved methods described, the distressing and disabling deformity of crural adduction has ceased to be, in the large majority of cases, the formidable matter that it has been, and I believe that where proper attention can be secured permanent adduction need never occur, and that when this condition has supervened it can be safely and quickly removed with scarcely any discomfort to the patient, and without resort to the knife or chisel in nearly all conditions except bony ankylosis.

Mr. Christopher Heath has said:¹ "Our duties in a case of fracture should be considered to end, not when the bone is found to be united, but only when the functions of the limb have been as far as possible restored." These words apply with ringing emphasis to the treatment of joint disease.

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¹ Minor Surgery, p. 297, 8th edition.

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